# The Tribune Radio—Comment and Advice—*By Jack Binns*

## Long-Forgotten Detector Cell Is Sensitive

### The Electrolytic Detector Is Slightly Better Than Crystal: Abandoned When the Vacuum Tube Came

### Easy to Make and Operate

### Very Stable and Doesn't Require Any Adjustment After It Has Been Set

Like all other arts, radio has its mysteries, and one of the most outstanding of these is the mystery surrounding the downfall of the electrolytic detector. This detector is of special interest to those radio fans who at present own crystal receiving sets, but yet have the opportunity and time to make parts for themselves.

The electrolytic detector is equally as sensitive as the best crystal, and, in my opinion, a little more sensitive than either. It enjoyed a brief reign in the realm of radio, and just as it was about to become the supreme ruler the vacuum tube was brought forth and all attention was promptly turned from the electrolytic to the newcomer. The possibilities of the vacuum tube were so promising that all further experimentation with the electrolytic detector was abandoned, and it quickly fell into an oblivion that it did not deserve, and which was not shared by the crystal detector.

**Similar to Crystal in Operation**

In operation the electrolytic detector is, to a great extent, very similar to the crystal detector and, in fact, its construction is almost identical. There is nothing difficult in its construction or adjustment. It consists of a small glass or carbon cup, in which is placed a few drops of a 20 per cent solution of nitric acid. This acid forms the electrolyte. The electrode consists of a piece of very fine platinum known as "Wollaston" wire, which just dips under the surface of the acid.

The circuit in which it is connected is exactly the same as that for a carborundum detector, in which a dry cell battery and potentiometer are used. Its operation, however, is entirely different. The generally accepted theory is as follows: That as soon as the local current is applied from the potentiometer across the cell, bubbles form around the platinum electrode, completely insulating it and stopping further flow in the circuit through the telephones.

**Theory of Operation**

As soon as the electro-magnetic waves received by the aerial pass through the oscillation circuits, consisting of the particular type of tuner used with the detector, the high frequency current induced dissipates the bubbles and restores the pathway for the local current to flow through, and this is recorded in the telephones in the usual manner, corresponding to the particular form of the received signals, whether it be voice or telegraph code.

The electrolytic cell is a very fine detector of radio telephone signals, and, in fact, was one of the first detectors to be used in the original experimental work that was undertaken in the development of telephony by means of wireless as far back as 1907. In constructing an electrolytic detector, practically the same form can be used as that now employed for the crystal detector. The arm which carries the cat's whisker for the galena can be used for the electrolytic detector. There is this very important exception, however, that the screw securing the platinum wire should have a left-handed thread of very fine gauge, so that an extremely small distance will be covered by one complete turn.

**Wire Must Only Touch Acid**

This is very important, because if more than the tip of the platinum is immersed in the acid the detector will not operate as efficiently as it will if the wire is only just touching. The platinum wire should be fused to the lower end of the screw, and should have a diameter of .0001 of an inch.

If Wollaston wire is used it will be found to be coated with silver in order to permit easier handling. This silver coating can be removed by a very strong solution of chemically pure hydrochloric acid, or else it can be removed by dipping it into a small amount of mercury that has been heated over a Bunsen burner.

The cup which holds the acid can be either glass or high-grade carbon. In the bottom of this a very small piece of platinum, about three-sixteenths of an inch square, should be placed, and this should be connected to one of the binding posts of the detector; the screw holding the platinum wire, of course, being connected to the other binding post.

**Three-Cell Dry Battery**

The local battery used in conjunction with this detector should consist of three dry cells, around which should be mounted a 3,000-ohm potentiometer. The telephones used in conjunction with the electrolytic detector may have a resistance as low as seventy-five ohms, but the ordinary 2,000-ohm radio telephones can be used without any difficulty whatsoever. The main point about the telephones is that they should be well constructed and sensitive. Another important point that must be observed is that the positive pole of the local battery must be connected to the arm carrying the platinum wire.

As stated before, the detector will operate in a sensitive condition across the very faintest portion of the wire in touching the acid, and this is one of the reasons that the electrolytic was abandoned because of the difficulty of getting that adjustment.

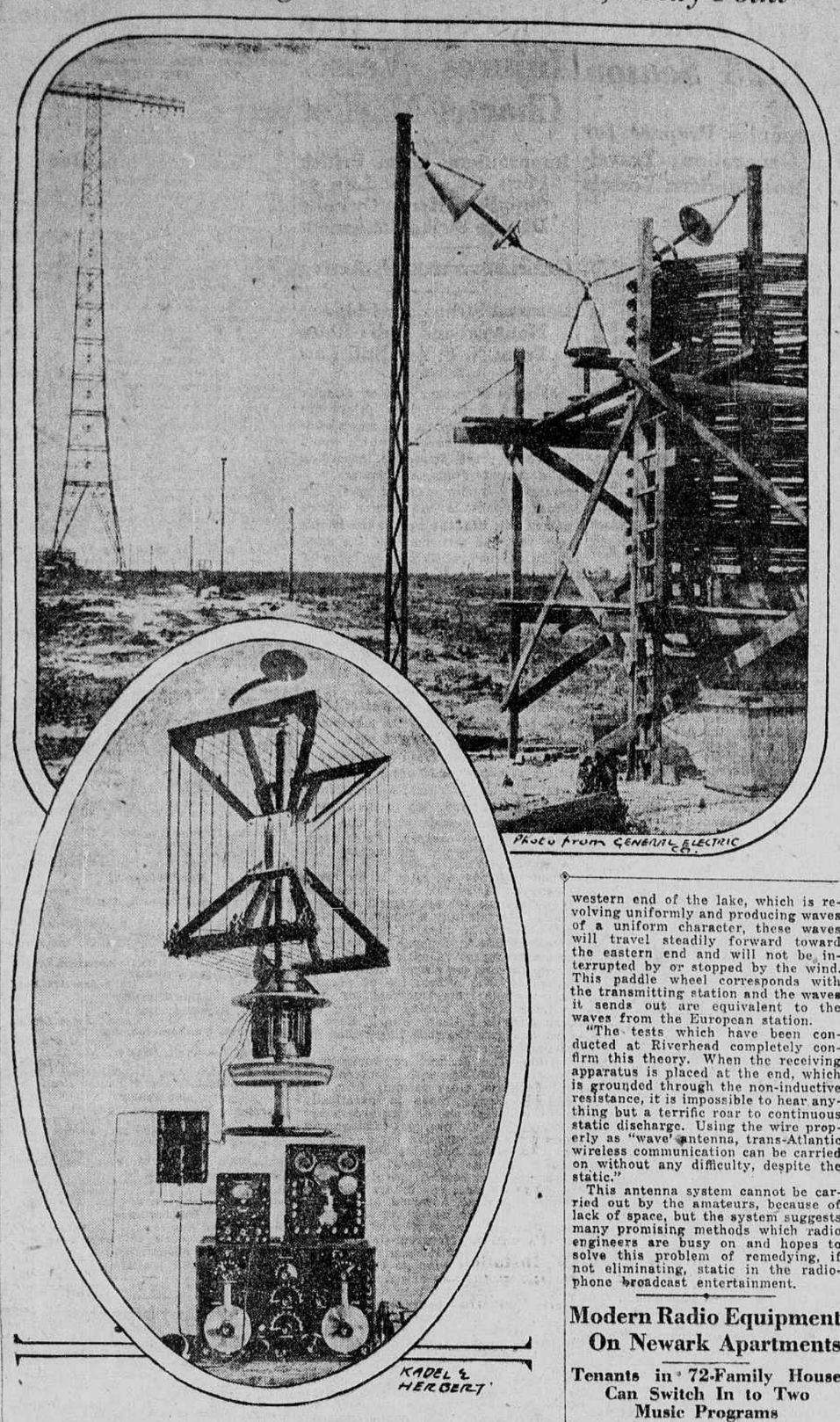
**Wire Fused in Glass**

At the time of its abandonment, however, it had been discovered that if the platinum wire was fused into glass and ground down so that a very minute portion of it was exposed the electrode could then be solidly immersed in the acid and the detector left in a rugged, reserve condition. This entails a little more trouble in making the detector, but it is trouble that is amply repaid by the results obtained.

The platinum is fused into glass in the manner the detector can then be put into a sensitive condition by screwing down the electrode into the acid and leaving it there. It will then be found to operate perfectly under all conditions without any trouble whatsoever and without any bother about readjustment at any time.

It should not be forgotten that with a potentiometer across the dry cell supply the battery is running down all the time and a switch should be placed in the circuit, so that when the receiver is not actually being used the battery can be disconnected from the potentiometer and its life thus prolonged.

## *Gigantic Tuning Coil at Radio Central, Rocky Point*




*The upper picture shows the huge outdoor tuning coil, or oscillation transformer, at the second largest radio station in the world, at Rocky Point, L. I. One of the big towers which supports the large transmitting aerial can be seen in the background. This station has already spoken direct to Australia. The lower picture shows a complete ship radio compass equipment. The big loop aerial used in "searching" for the station in getting a bearing is shown above the receiving equipment. The aerial is calibrated to compare with points of the compass. This apparatus is so arranged that direct readings can be obtained and a bearing calculated in a few seconds.*

## "Wave" Antenna Permits Cross Ocean Reception Thru Static

### Engineer Describes Its Working by Clear Analogy; Experiments Now Being Undertaken to Effect Similar Practice on Radiophone Sets

By P. H. Boucheron

The thousands of amateur radio fans, a majority of whom are realizing for the first time what an interference static is to the reception of the various programs broadcast, will be interested in knowing what means the large commercial companies, such as the Radio Corporation of America, are taking to offset this atmospheric disturbance.

Perhaps the chief means used by the Radio Corporation is in the type of aerial. This is known as the "wave" antenna, which in addition to reducing static interference, has greatly increased the efficiency of trans-Atlantic wireless telegraphy.

An explanation of this antenna is best gained by a description of its use at the chief receiving station of the Radio Corporation, located at Riverhead, L. I. This station received from all European stations which are using wave lengths ranging around 15,000 meters in length, or in other words, electro-magnetic waves each approximately nine miles long.

**Aerial Nine Miles Long**

In order to fulfill all of the requirements of the theory covering the operation of the new antenna it is necessary to have a receiving aerial one full wave length long, or in other words a receiving aerial wire miles in length. This is exactly what has been installed at Riverhead. The aerial is nine miles long, and is supported on poles thirty feet above the ground, one end being grounded through a non-inductive resistance, and the other through a variable inductance. With this wire the Riverhead station is daily receiving five different European stations simultaneously without interference.

To illustrate the operation of the "wave" antenna, an engineer of the Radio Corporation of America has drawn the following analogy:

"If we look upon the new antenna as a large lake and the wind as the static we can get an idea how it works. Now suppose the wind is blowing across the lake from east to west. At the eastern end there will be little or no ripples, but as we get to the western end the ripples will gradually increase in size to full waves. If the shore at the western end is a gentle slope of sandy gravel the waves will be dissipated and will not be reflected. "If, on the other hand, the shore of the lake is precipitous and rocky, the waves will be reflected and will disturb the eastern end of the lake. Now this antenna, having a non-inductive resistance at its non-receiving end, corresponds to a sandy shore, because it absorbs the static and interfering waves and does not reflect them.

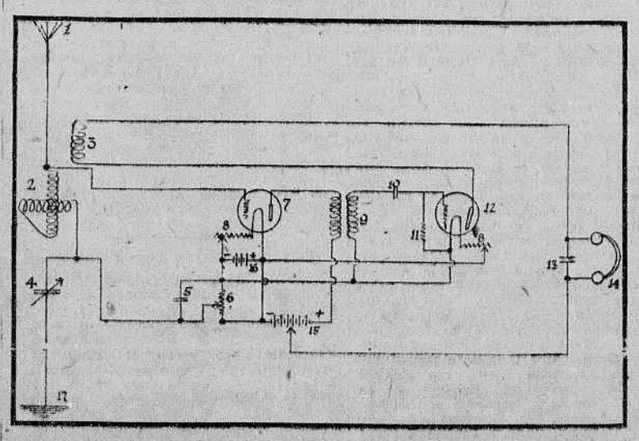
**Manner in Which it Works**

"Carrying the analogy further, if we place a stationary paddle wheel at the western end of the lake, which is revolving uniformly and producing waves of a uniform character, these waves will travel steadily forward toward the eastern end and will not be interrupted by or stopped by the wind. This paddle wheel corresponds with the transmitting station and the waves it sends out are equivalent to the waves from the European station.

"The tests which have been conducted at Riverhead completely confirm this theory. When the receiving apparatus is placed at the end, which is grounded through the non-inductive resistance, it is impossible to hear anything but a terrific roar to continuous static discharge. Using the wire properly as "wave" antenna, trans-Atlantic wireless communication can be carried on without any difficulty, despite the static."

This antenna system cannot be carried out by the amateurs, because of lack of space, but the system suggests many promising methods which radio engineers are busy on and hopes to solve this problem of remedying, if not eliminating, static in the radiophone broadcast entertainment.

## The Radio Primer




The diagram above shows one stage of radio frequency connected to a vacuum tube detector. This circuit has been tested in the laboratory of the Tribune Institute and works perfectly and clearly without distortion. It was tried out on an indoor aerial consisting of a single wire fifty feet long, number 18 covered annunciator.

The numbers in the diagram are as follows: 1, aerial; 2, standard short wave variometer; 3, tickler coil, also standard variometer; 4, variable condenser .0005 mfd capacity; 5, fixed condenser .002 mfd capacity; 6, potentiometer 200 ohms resistance; 7, vacuum tube U. V. 201; 8, rheostat; 9, radio frequency transformer; 10, grid condenser; 11, grid leak; 12, vacuum tube; 13, phone condenser; 14, telephones; 15, B. battery, 45 volts, 22½ volts on detector tube, 17 ground.

## What Variation Of Resistance Does in Set

### Outlining the Positive and Negative Resistance of Circuit Mentioned in Armstrong's Invention

### Action Highly Technical

### When Power Leaves Circuit Resistance Is Positive; Negative When Entering

Ever since Major E. H. Armstrong made a complete disclosure of his invention (the super-regenerator), the radio fans generally have been completely baffled by the terms "negative" and "positive" resistance of the circuit.

In describing this system in his technical paper before the Institute of Radio Engineers he said that there were three methods of producing the super-regenerative state by varying the relation between the negative and positive resistance of the circuit. The first method consisted of varying the negative resistance with respect to the positive and the second by varying the positive resistance with respect to the negative, and the third, "a combination of those two systems in which simultaneous variations are produced in both negative and positive resistances and provision made for adjusting the relative phases of these two variations."

This description, of course, is too highly technical to be readily understood, and it is a very difficult matter to describe clearly just what is meant by "positive" and "negative" resistance of a circuit, but I shall try in this article to make it as clear as I possibly can.

**Waves Are Alternating**

In the first place, it must be understood that the electro-magnetic waves which travel from the transmitting station to the receiving station are of an alternating character. That is, they change from positive to negative at certain definite intervals each second.

Another point that should also be remembered is that the rapidity with which these currents change from positive to negative is directly connected in relationship to the length of the wave that the transmitting station sends out. Thus, in the 360-meter wave used by the majority of broadcasting stations we have an alternating current which has a frequency of 833,000 cycles per second. In other words, there are that number of changes from positive to negative every second.

The relationship between this frequency of alternation and the length of the wave is governed by the speed with which electro-magnetic waves travel; namely, 300 million meters per second. Therefore, it will be seen that if a wave is 5,000 meters long the frequency will be 60,000 cycles per second.

**Feedback Is Equal to Negative**

The various types of receiving circuits are built to operate under the conditions imposed by these frequencies. In the ordinary regenerative set Armstrong states that the introduction of a feed-back coil is equivalent to introducing a negative resistance in the circuit, and this neutralizes the positive resistance reaction of the circuit and thereby reduces the effective resistance of the circuit.

Perhaps the simplest way in which this rather complicated condition can be explained is in the words of Professor J. H. Morecroft, of Columbia University, who says in his "Principles of Radio Communication" that in an alternating current circuit power must be transferred between two points in a circuit in such a way that it may be either leaving the circuit or entering the circuit between those two points.

He then continues: "If power is leaving the circuit between these points, as heat or otherwise, the resistance is positive; if power is entering the circuit between these two points the resistance is negative, and if power is entering the circuit at the same rate as it is leaving, then the resistance is zero. From this standpoint any electrical circuit carrying current after reaching the steady state (no change in the amplitude of the current) has, on the whole, zero resistance, but we may consider the source of power supply as having as much negative resistance as the rest of the circuit has positive resistance.

**Relation of Two Resistances**

At the generator (or other source of power supply) energy is entering the circuit as fast as it is dissipated in other parts of the circuit. If the circuit, as a whole, has positive resistance the current must be decreasing in amplitude; this state of affairs occurs in the ordinary damped oscillatory discharge of a condenser, whereas a circuit which takes an appreciable time to build up to its steady state has, during the time required to reach the steady state, on the whole a negative resistance because, considering the circuit as a whole, energy is entering at a rate faster than that at which energy is leaving.

In order to make this as clear as we possibly can, we can momentarily assume that the regenerative action is equivalent to the negative resistance of the circuit, and that the damping action which tends to wipe out the electrical vibrations, corresponds to the negative resistance.

In the regenerative receiver, the regenerative action will continue up to a certain point when the vacuum tube suddenly goes into a state of oscillation and prevents us from getting the increased amplification that would otherwise be possible.

What Armstrong has done, therefore, in this case, is to devise a system which will wipe out the effect of damping and permit the regeneration to continue up to the limit of the capacity of the particular tube that is being used in the circuit.

**System Explained in Patent**

In the letters patent, which were issued to him on July 25 of this year, the system is described as follows: "The principle of this invention may be understood from the following general analysis. In the usual form of circuit employing the regenerative or feedback principle, the regenerative amplification continuously increases as the feedback coupling is increased, or broadly, as the amplified oscillation is utilized more and more to reinforce the original oscillation, until the point of oscillation is reached; that is, the point where the regenerative effect is strong enough to automatically build up an oscillation and maintain it indefinitely by the energy derived from the local battery. The regenerative amplification is a maximum either at this point or at a point slightly above or below it, depending on the initial strength of the signal, the characteristics of the vacuum tube or tubes and the circuits associated therewith.

## Modern Radio Equipment On Newark Apartments

### Tenants in 72-Family House Can Switch In to Two Music Programs

A choice of "listening in" to either of two programs being sent out by the big broadcasting stations will be a feature of a unique radio system being installed in a seventy-two-family apartment house in Newark, N. J., by the Davis Electric Company. Two complete receiving sets will be installed, each with a large loop or directional aerial, pointed to a particular broadcasting station, and the program received without interference from whatever may be coming in on the other loop.

A special radio room, in charge of a licensed operator, will house the equipment. From this room will emanate two complete circuits connected to each of the seventy-two apartments and so arranged that the tenant may plug in his receiving set to whichever of two programs he may prefer. The apartment operator will tune in each evening to the two stations that offer the best programs or are heard the clearest, and in this way the tenants will be able to enjoy the best in the ether each night with the least of trouble.

Two complete receiving sets, each equipped with a detector tube, two stages of audio and two steps of radio frequency, will be installed.

**Fishermen Use Radio**

Gloucester fishermen have taken up radio with great enthusiasm. Owners of the large fleets that sail from the Massachusetts port are planning to use the radiophone for the direction of their vessels, and they hope to be able to save thousands of dollars by the direct touch with their floating outposts which radio should give them.

## First Aid for the Radio Fan

### Farm Light Plan for the Filaments Adding Radio Frequency to the Receiver; Advantages of the Vernier Control

**Telephones in Series**

Question—My brother and I have a crystal set and two pairs of phones hooked-up in series, the one pair of phones being in an adjoining room about seventy-five feet from the other phones and the set. We notice that the phones hooked-up by the set are very faint, while the other phones are very loud. It might be well to state that one pair is about three months old and the other pair about one week old. The ones that are three months old are those that are very faint, although we notice they work fairly well when hooked up alone. Being both invalids and confined to our beds, the radio is a blessing to us, so any information you may be able to give us to straighten us out certainly will be greatly appreciated.—O. R. W.

Answer—It may be that one pair of phones that you have is faulty; and I feel sure, if that is the case, that the manufacturer would gladly exchange them for you if you get in touch with him. I should judge offhand that this is the trouble. If you place a telephone condenser across the two pairs of telephones, I think that it will help materially. You can get a fixed condenser of .0025 mfd. capacity for this purpose, and can obtain such a condenser for approximately 35 cents.

**Comparing Two Systems**

Question—In regard to the super-heterodyne: (1) How does it compare with the super-regenerative as far as results are concerned? (2) Are the two detector tubes UV-200s or 201s? (3) If UV 200s, should not 22½ volts be used on the plate instead of 40?—R. C.

Answer—The super-heterodyne is about equal to the super-regenerative, but the operation of the two circuits is entirely different. The super-regenerative receiver is suitable chiefly for music reception and cannot be used with an aerial. The super-heterodyne can be used with an aerial and is extremely good for continuous-wave telegraph reception on short waves, although it also can be used for longer wave reception. It also is excellent for radiophone reception. The two detector tubes can be 200s, but I always recommend 201s for detectors. I am convinced that hard tubes give much better results. If 200s are used voltage should be 22½ or less.

**Using Farm Lighting Plant**

Question—We have a 32-volt farm lighting plant here. Would I be able to cut it down so as to use only 6 volts? I can use three batteries, each giving 2 volts, but I would have to run two extra wires. I ought to be able to cut it down so as to use it as a "B" battery. If you know of any way this can be done, taking off from the main line, please let me know. —S. G. P.

Answer—It will be quite feasible for you to use the 32 volt lighting plant for your radio receiving equipment. In order to light the filaments of your vacuum tubes it will be necessary to take two leads from three of the cells, so that you get 6 volts on the filament. You can use the entire 32 volt battery for the plate circuit, taking care, of course, that the positive lead from the battery is connected to the plate of your vacuum tubes. The only trouble that you will experience with this battery is during the period of charging, when you may get a ripple from the charging dynamo.

Question—(1) How can I improve my primary tuning coil? It has 180 turns. (2) Would the series parallel switch increase the wave length, or would I have to use the two loading coils which you speak of in the issue of July 30? If so, (a) what sized coils would I need? (b) If I increased my antenna to 125 feet would I get better results? (c) Who are the following: 2CES, 2AQJ, 2LT, 2XAK, 2CAK, WGAC?—H. M. B.

Answer—I think taht you will be able to improve your tuning facilities by taking single taps off the first ten turns of your inductance coil, and joining these taps to a separate inductance switch. This will give you closer tuning facilities.

The series parallel switch, with your large aerial tuning inductance, should be quite sufficient to bring in WVP at 1,450 meters. It may be necessary, however, to load up the tickler coil by adding another 100 turns in series with it for WVP. This, of course, will not be necessary for the 360 meter station. No other loading is necessary, so far as I can see.

If you increased your antenna to 125 feet, I think that you would get slightly better results.

Station 2CES is that of F. J. Roach, 3044 Kingsbridge Avenue, New York.

Station 2AQJ is that of W. B. Finnigan, 2433 Valentine Avenue, New York.

Station 2LT is that of N. C. Hall, 157 Roseville Avenue, Newark, N. J.

Station 2XAK is that of I. R. Nelson, Newark, N. J.

Station 2CAK is that of G. M. Meehren, 2039 Creston Avenue, Bronx, New York.

Station WGAC is that of the Orpheum Radio Stores, 637 Fulton Street, Brooklyn.

**Receiving C. W. Stations**

Question—To receive continuous waves, do I need the rectifier (crystal or vacuum tube detector) as it should be audible in the phone receiver without rectifying the wave which is received? If not, why?—M. Y.

Answer—You cannot receive continuous waves with a crystal detector unless you have an external heterodyne system, in order to make the received signals audible in the telephones. It cannot be done with the vacuum tube detector unless you use a regenerative receiver with a vernier control, so that the receiver can be turned into a self-heterodyne. What is meant by "heterodyne" in this case is simply a local source of power production, which will produce waves of radio-frequency, either just below or just above the frequency of the incoming waves. The best form is to have a difference of 500 cycles a second between the incoming wave and the wave produced by the local heterodyne. The two waves will then clash; or, in other words, be out of phase with each other 500 times every second, and this will produce an audible note corresponding to the dots and dashes in your telephone receivers of a frequency of 500 cycles per second.

Question—Will you be kind enough to give one of your readers a little advice? I have a home-made triple honeycomb coil receiving set with two stages of audio-frequency amplification, using the standard regenerative circuit. My "aerial" consists in one side of the house bell circuit, from which I get very good results. I hear all of the metropolitan stations, also WGY, and sometimes NOF. I would like now to increase the receiving distance of my set, using the same form of "aerial," and am thinking of putting in two stages of radio-frequency amplification without disturbing my present hook-up. From your answers to various readers I gather that you are not enthusiastic over radio-frequency amplification on short waves because of the lack of efficient transformers on the market. I was thinking of using UV 1714 transformers, as these are made by reliable people, and I have been told that they give good results. What I would like to know is this: Do you think my receiving range would be greater using this form of amplification, or will you be good enough to suggest some other means of getting the desired receiving distance?—L. R. J.

Answer—My lack of enthusiasm for radio-frequency amplification, so far as short waves are concerned, is not solely because of the transformer, but also because of the fact that the vacuum tube itself is such a peculiar instrument, and although it is produced in standard form upon a quantity production basis, nevertheless there are no two tubes with identical characteristics. This is particularly true of the capacity effect of the tube, which is a very important factor at the very high frequencies involved in short wave work. Under the circumstances, therefore, a radio-frequency transformer which will operate quite satisfactorily with one particular tube is absolutely hopeless when a different tube is put into the socket. There isn't any question about the ability of radio-frequency amplification to increase the distance over which you can receive with your present equipment, provided that you are lucky enough to get tubes and transformers that absolutely match each other. It might not be a bad idea to start off with one stage of radio-frequency amplification attached to your present set and experiment with it until you become thoroughly acquainted with its operation. It will be absolutely necessary to use a potentiometer in order to stabilize the radio-frequency section of your set in this case.

**What Is a Vernier?**

Question—1. Is the lead-in counted as part of the aerial? 2. What are the advantages of the vernier adjustment? 3. What are some stations that operate on wave lengths of between 15,000 and 20,000 meters? 4. Do you think that I could operate a loud speaker without amplification when I receive Burlington, Vt.? It is about forty miles in an air line and over water. 5. Should wires run parallel to each other in wiring the instruments? 6. How far apart should the amplifying transformer be in the cabinet? 7. How close can the variometers and variocoupler be in the cabinet?—C. R. J.

Answer—1. Yes. 2. A vernier adjustment is absolutely imperative in a regenerative receiver in order to get what is known as the zero beat adjustment for the reception of radio telephony. This is the adjustment at the point where there is no self-heterodyning in your set, or between the set itself and the carrier of the transmitting station. It is the point where the music is purest and freest from distortion, and can be obtained only by very minute adjustment.

3. The big trans-Atlantic and some of the Pacific stations operate on wave lengths of 15,000 and 20,000 meters. Off-hand, some of them are Annapolis, Md.; Eilvese, Germany; Lyons, France; Bordeaux, France; Tuckerton, N. J.; Radio Central, on Long Island, and St. Assize, France. Of these stations the one with the longest wave length is Bordeaux, France, which transmits on 23,400 meters.

4. That will depend entirely upon the strength of the signals and the amount of power used in the transmitting station at Burlington.

5. No more than possible under the existing conditions. They should be as much at right angles as you can possibly get them.

6. The amplifying transformers can be fairly close, provided they are set at right angles to each other.

7. The vario-meters and vario-coupler can be close to each other in the cabinet, provided that you shield them from each other. By this is meant metallic shields connected to the ground, which are free and clear of the apparatus and its connections.

**Toy Transformer Useless**

Question—I have at my disposal the following apparatus: Three spider-web coils of 28, 24 and 20 turns, one variometer of about 50 turns on rotor and same number on stator, 1 radiotron UV200, socket, grid-leak (variable), grid condenser, filament rheostat, B battery (22 v.), potentiometer, toy transformer (.05 watts), capable of giving 3 or 7½ volts. Kindly give me a hook-up using as much of the above apparatus as possible. I understand that a potentiometer requires a B battery of 18 volts. Please advise me whether this is true. In a circuit consisting of two variometers, vario-coupler and variable condenser (.001), where should the latter be placed?—W. I.

Answer—In reply to your letter, if you use the spider web coils you will need, in addition, two variable condensers. In this case, one spider web coil will be placed in the aerial circuit in series with the variable condenser and the other variable condenser will be shunted across the spider web coil used in the secondary. The third spider web coil will act as a tickler coil and will be placed in series with the plate of the vacuum tube and the positive terminal of your B battery.

The toy transformer is absolutely useless to you. You will need a 6-volt storage battery of some kind to light the filament of the radiotron. The potentiometer will be placed across this storage battery and the negative lead from the B battery will be connected to the slider of the potentiometer. The amount of B battery does not make any difference to the potentiometer in a circuit of this description, provided it is of 200 ohms maximum resistance. In the circuit using two variometers and a vario-coupler, the variable condenser should be placed in series with the aerial and the primary of the vario-coupler.

**Coupler in Super-Regenerator**

Question—In your diagram of Armstrong's three-tube super-regenerator in the issue of July 2, you give the capacity of the variable condenser in series with the iron core choke and the resistances (condenser is marked C5) as .001 mfd. I have seen several other hook-ups of super-regenerator and in each case the capacity of this condenser was given as .005 mfd. Which is right? Is an .001 suitable, and if not, how can I get an .005 variable? 2. You advise 80 and 100 turns on primary and secondary of vario-coupler for use with super-regenerator. I do not expect to use a loop aerial with the set. I wish to use my indoor two-wire 25 feet aerial with 25 feet lead-in. It is on the ceiling of the first floor. I use this aerial with my regenerative set and use only 20 to 25 turns on primary of vario-coupler to tune to 360 meters, so I do not see why the super-regenerator vario-coupler should have 60 turns to tune to the same wave length with the same aerial, and especially as it is shunted by an .001 mfd. condenser. Please let me know the minimum number of turns on both primary and secondary to tune to 400 meters with this aerial with no more taps than necessary to bring in concerts from broadcasting stations. Would a three-plate Vernier condenser across the tuning coil C1 be useful? Are there any particular leads which should be very short?—C. C. D.

Answer—You must understand clearly that the super-regenerator is an entirely different system from the regenerative system, and consequently the factors governing the latter do not apply to the former. I would strongly advise the use of the indoor aerial that you describe if there are any amateur transmitting stations in your vicinity, because the moment that they start up they will completely paralyze your receiver, due to its terrific amplifying factors. It is not absolutely necessary to have eighty turns on the primary of the vario-coupler—fifty will be sufficient. But it is necessary to have about one hundred turns on the rotor, as it is needed in the feed-back of this system. With regard to the variable condenser in series with the iron core choke, Major Armstrong's own figures were .001 mfd. capacity, but he pointed out that this would have to be varied according to the circuit itself and the character of the choke. As a condenser of .005 mfd. capacity is such a very large one, I would suggest that you build the condenser up by placing a suitable number of Micadons in parallel with each other, as the cheaper way of achieving .005 capacity. The letters that I have received from readers who are located at distances from New York indicate that their success with the loop aerial has been equally as good as those residing in the city, so that I do not think that you will have any difficulty in obtaining results with a loop aerial and you will have the advantage of the directive effect that is obtained from the loop. A Vernier condenser shunted across the condenser which tunes the loop will be of great assistance to you, and I would recommend it.

**Factory Whistle Kills Set**

Question—Recently, while seated at my window listening in on WJZ, I was receiving reception very distinctly, when suddenly I happened to notice the escaping steam from a factory a short distance away. Upon hearing a sound of this whistle reception on my set ceased, but returned as soon as the blast of the whistle died out. The factory is located east and WJZ west of me.

I have tried the single antenna, 85 feet long, 45 feet lead in, 75 feet ground and find it to be very sensitive, but strength of single not so strong, although I have less interference from code. Antenna 65 feet high and 25 feet high on receiving end. I have returned to the two-wire antenna because I find more capacity.

My set is Armstrong circuit, vario-coupling, 5¼ inches diameter 7 inches long, tickler 3 inches diameter, wound 14 taps every eight turns on primary, same on secondary and twenty-five turns on tickler. Both wound with No. 23 wire, cotton covered; 43 plate condenser, A.P. detector, 2-201 tubes and two Federal transformers placed at right angles. Three rheostats and three double circuit jacks on the single antenna. What is the wave length on single, also on the double, using seven strand copper weld for aerial. March 29 I had WWJ. I have had WGY, KDKA, WGI and WJZ, although for the last six weeks I have been unable to get any of the stations, except the local ones. I am using 120-amp. 6-volt battery, 22½-volt on detector and 90 volts on the two 201 tubes. Of late the reception has not been strong; do you advise two stages of radio frequency in this set with two stages of audio frequency, or will I have to rewind the vario-coupling for frequency? This is a home-made set.

Location is near Cypress Hills Cemetery and have numerous tall trees in the vicinity. Elevated road is 225 feet north on parallel with antenna, at 300 feet west from antenna running at right angles to me. Aerial at receiving end about 30 feet above the third rail.—C. T. S.

Answer—I cannot account for the experience that you relate, in which the blast from the factory whistle caused your set to die out. It is something new to me. The maximum wave length of your apparatus with either of the two aerials is in the neighborhood of 1,200 meters. The additional wire in your aerial makes but very little difference so far as wave length is concerned. Your experience with long distance stations is undoubtedly due to freakish conditions in the ether, which sometimes are quite frequent and at other times are infrequent. There is no satisfactory explanation for this, nor can we figure out when it will occur. Apparently, there is nothing the matter with your set, as your reception seems to be very good. I would not, under any circumstances, advise you to add two stages of radio-frequency unless you want to invite a lot of trouble; but if you desire to do it for experimental purposes, it will be perfectly all right. However, in that case, I would suggest that you use a loop aerial for reception; otherwise, you will paralyze your tubes when the local stations begin operating.

**Using Rotor for Tickler**

Question—I am going to build a set using a 43-plate condenser—.001, a 3-plate Vernier condenser and a 14 tap with the taps in the coupler primary. Would this give the same results as the variometer reactor used in the R. C. set, or would I have to get a reactor the same as the R. C. set? Would the tickler coil be hooked on the primary or the secondary circuit?—F. B. McB.

Answer—I would suggest that you use the primary winding of the vario-coupler in series with the 43-plate condenser for your aerial tuning circuit, and use the rotor coil of the vario-coupler as the regeneration or tickler coil.